What is claimed is:

1. A composition comprising a compound of formula R_1SR_2, trichloroisocyanuric acid and a base, wherein R_1 and R_2 are each independently -(C_1-C_{20})alkyl -(C_3-C_8)cycloalkyl or -phenyl.

2. The composition of claim 1, wherein R_1 is -CH_3 and R_2 is -(C_1-C_{20})alkyl.

3. The composition of claim 2, wherein R_1 is -CH_3 and R_2 is -(C_{12})alkyl.

4. The composition of claim 1, wherein the amount of the compound of formula R_1SR_2 ranges from about 1.0 to about 9.0 molar equivalents per molar equivalent of trichloroisocyanuric acid.

5. The composition of claim 4, wherein the amount of the compound of formula R_1SR_2 ranges from about 2.0 to about 5.0 molar equivalents per molar equivalent of trichloroisocyanuric acid.

6. The composition of claim 5, wherein the amount of the compound of formula R_1SR_2 ranges from about 2.5 to about 3.5 molar equivalents per molar equivalent of trichloroisocyanuric acid.

7. The composition of claim 1, wherein the base is an organic amine.

8. The composition of claim 7, wherein the organic amine is triethylamine, diisopropylethylamine, pyridine, dimethylpyridine or dimethylaminopyridine.

9. The composition of claim 8, wherein the organic amine is triethylamine.

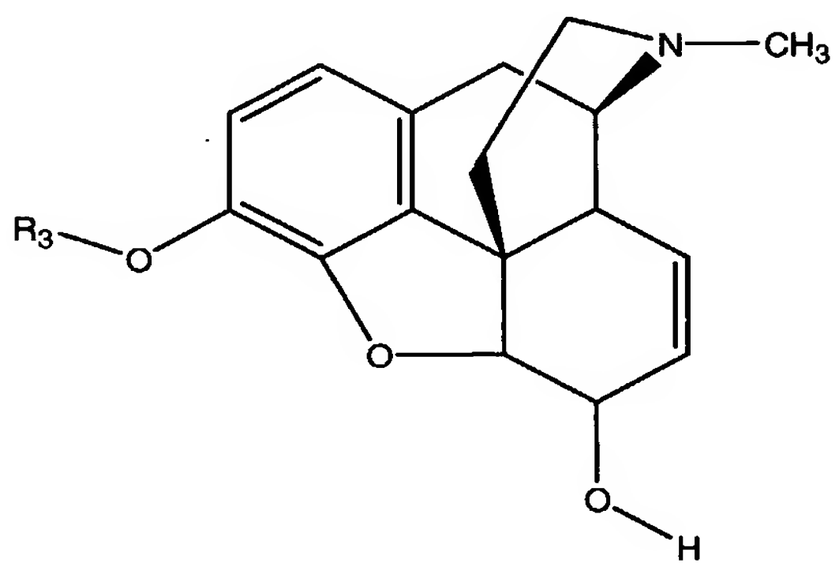
10. The composition of claim 1, wherein the amount of base ranges from about 1.0 to about 15.0 molar equivalents per molar equivalent of trichloroisocyanuric acid.

11. The composition of claim 10, wherein the amount of base ranges from about 2.0 to about 10.0 molar equivalents per molar equivalent of trichloroisocyanuric acid.

12. The composition of claim 11, wherein the amount of base ranges from about 2.5 to about 7.0 molar equivalents per molar equivalent of trichloroisocyanuric acid.

13. The composition of claim 1, further comprising a primary or secondary alcohol.

14. The composition of claim 13, wherein the secondary alcohol has the formula (I):



(I),

wherein R_3 is a protecting group.

15. The composition of claim 14, wherein R_3 is -(C_1-C_{10})alkyl, -benzyl, -C(O)(C_1-C_{10})alkyl, -C(O)O(C_1-C_{10})alkyl), -Si((C_1-C_{10})alkyl)$_3$, -Si(aryl)((C_1-C_{10})alkyl)$_2$, -Si(aryl)$_2$((C_1-C_{10})alkyl), -P(O)((C_1-C_{10})alkyl)$_2$, -P(S)((C_1-C_{10})alkyl)$_2$, or -S(O)OC_6H_4-*p*-CH_3.

16. The composition of claim 15, wherein R_3 is -CH_3.

17. The composition of claim 15, wherein R_3 is -Si((C_1-C_{10})alkyl)$_3$, -Si(aryl)(C_1-C_{10})alkyl)$_2$, or -Si(aryl)$_2$(C_1-C_{10})alkyl).

18. The composition of claim 17, wherein R_3 is -Si(CH_3)$_2$(C(CH_3)$_3$).

19. The composition of claim 13, wherein the amount of the alcohol ranges from about 1.0 to about 9.0 molar equivalents per molar equivalent of trichloroisocyanuric acid.

20. The composition of claim 19, wherein the amount of the alcohol ranges from about 2.0 to about 5.0 molar equivalents per molar equivalent of trichloroisocyanuric acid.

21. The composition of claim 20, wherein the amount of the alcohol ranges from about 2.0 to about 4.0 molar equivalents per molar equivalent of trichloroisocyanuric acid.

22. The composition of claim 1 further comprising an organic solvent.

23. The composition of claim 21, wherein the organic solvent is benzene, toluene, xylene, mesitylene, chlorobenzene, dichloromethane, chloroform, carbon tetrachloride, dichloroethane, diethyl ether, dipropyl ether, di-butyl ether, methyl-tert-butyl ether, tetrahydrofuran, methyltetrahydrofuran, ethyl acetate, or any combination thereof.

24. The composition of claim 23, wherein the organic solvent is dichloromethane.

25. A method for making a ketone, comprising allowing a secondary alcohol to react in the presence of a compound of formula R_1SR_2, trichloroisocyanuric acid and a base under conditions sufficient to make the ketone, wherein R_1 and R_2 are each independently -(C_1-C_{20})alkyl, -(C_3-C_8)cycloalkyl or -phenyl.

26. The method of claim 25, wherein R_1 is $-CH_3$ and R_2 is -(C_1-C_{20})alkyl.

27. The method of claim 26, wherein R_1 is $-CH_3$ and R_2 is -(C_{12})alkyl.

28. The method of claim 25, wherein the amount of the compound of formula R_1SR_2 ranges from about 1.0 to about 9.0 molar equivalents per molar equivalent of trichloroisocyanuric acid.

29. The method of claim 28, wherein the amount of the compound of formula R_1SR_2 ranges from about 2.0 to about 5.0 molar equivalents per molar equivalent of trichloroisocyanuric acid.

30. The method of claim 29, wherein the amount of the compound of formula R_1SR_2 ranges from about 2.5 to about 3.5 molar equivalents per molar equivalent of trichloroisocyanuric acid.

31. The method of claim 25, wherein the base is an organic amine.

32. The method of claim 31, wherein the organic amine is triethylamine, diisopropylethylamine, pyridine, dimethylpyridine or dimethylaminopyridine.

33. The method of claim 32, wherein the organic amine is triethylamine.

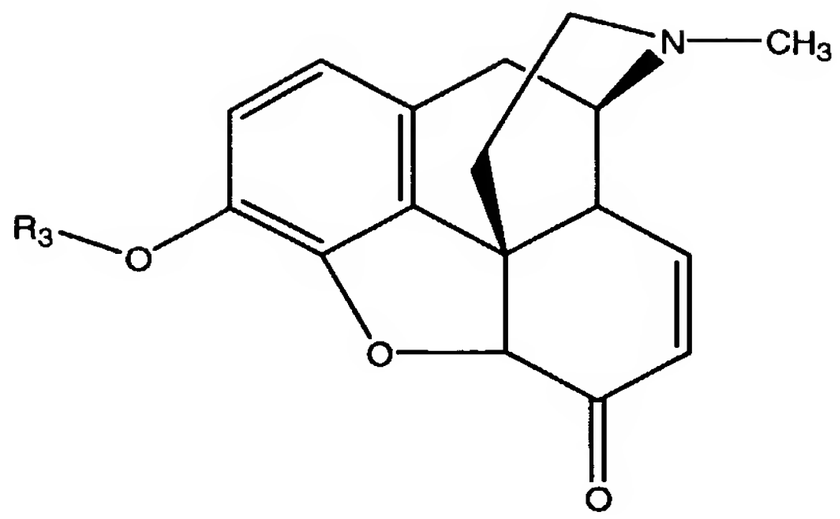
34. The method of claim 25, wherein the amount of base ranges from about 1.0 to about 15.0 molar equivalents per molar equivalent of trichloroisocyanuric acid.

35. The method of claim 34, wherein the amount of base ranges from about 2.0 to about 10.0 molar equivalents per molar equivalent of trichloroisocyanuric acid.

36. The method of claim 35, wherein the amount of base ranges from about 2.5 to about 7.0 molar equivalents per molar equivalent of trichloroisocyanuric acid.

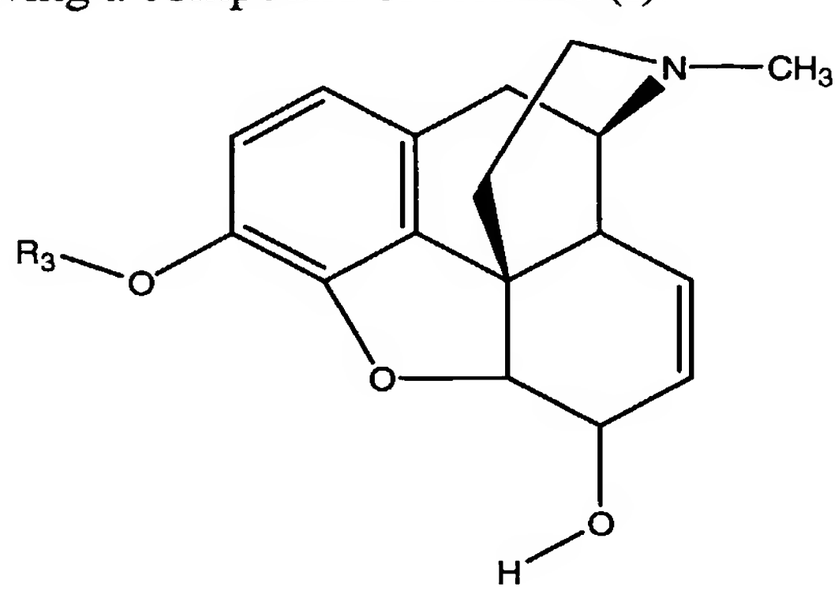
37. A method for making an aldehyde, comprising allowing a primary alcohol to react in the presence of a compound of formula R_1SR_2, trichloroisocyanuric acid and a base under conditions sufficient to make the aldehyde, wherein R_1 and R_2 are each independently -(C_1-C_{20})alkyl, -(C_3-C_8)cycloalkyl or -phenyl.

38. A method for making a compound of formula (II):



(II)

comprising, allowing a compound of formula (I):



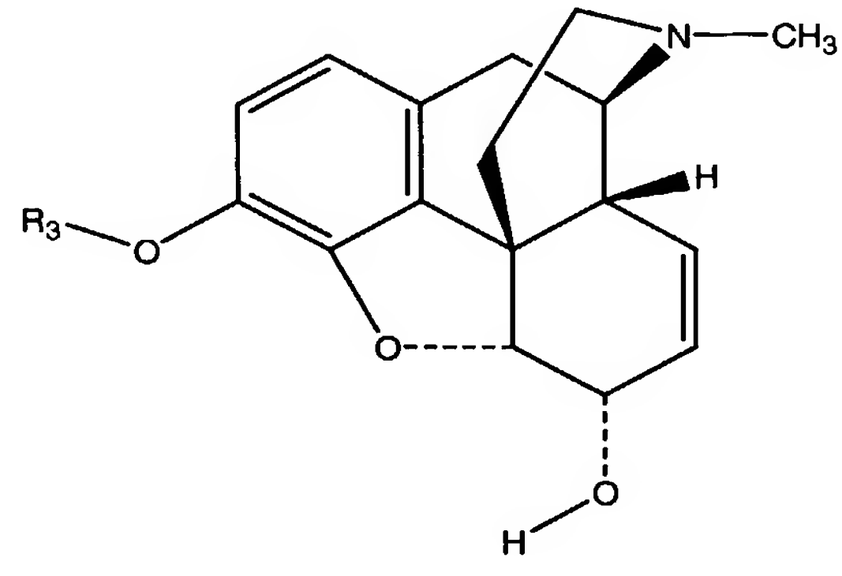
(I),

to react in the presence of a compound of formula R_1SR_2 and a chlorine-containing reagent under conditions sufficient to make the compound of formula (II); wherein

R_1 and R_2 are each independently -(C_1-C_{20})alkyl, -(C_3-C_8)cycloalkyl or -phenyl; and

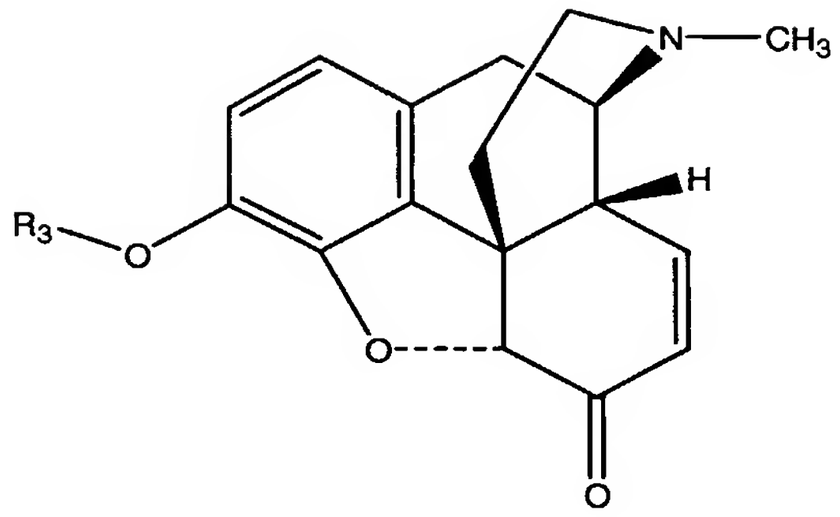
R_3 is a protecting group.

39. The method of claim 38, wherein the compound of formula (I) is a compound of formula (Ia):



(Ia),

and the compound of formula (II) is a compound of formula (IIa):



(IIa).

40. The method of claim 38, wherein R_3 is -(C_1-C_{10})alkyl, -benzyl, -C(O)(C_1-C_{10})alkyl, -C(O)O(C_1-C_{10})alkyl), -Si((C_1-C_{10})alkyl)$_3$, -Si(aryl)((C_1-C_{10})alkyl)$_2$, -Si(aryl)$_2$((C_1-C_{10})alkyl), -P(O)((C_1-C_{10})alkyl)$_2$, -P(S)((C_1-C_{10})alkyl)$_2$, or -S(O)OC_6H_4-*p*-CH_3.

41. The method of claim 40, wherein R_3 is -CH_3.

42. The method of claim 40, wherein R_3 is -Si((C_1-C_{10})alkyl)$_3$, -Si(aryl)(C_1-C_{10})alkyl)$_2$, or -Si(aryl)$_2$(C_1-C_{10})alkyl).

43. The method of claim 42, wherein R_3 is -Si((C_1-C_{10})alkyl)$_3$.

44. The method of claim 43, wherein R_3 is -Si(CH_3)$_2$(C(CH_3)$_3$).

45. The method of claim 38, wherein the chlorine-containing reagent is trichloroisocyanuric acid, N-chlorosuccinimide, sodium dichloroisocyanurate, 1,3-dichloro-5,5-dimethylhydantoin, Cl_2, calcium hypochlorite, or any mixture thereof.

46. The method of claim 45, wherein the chlorine-containing reagent is trichloroisocyanuric acid.

47. The method of claim 38, wherein the amount of the compound of formula (I) ranges from about 1.0 to about 9.0 molar equivalents per molar equivalent of the chlorine-containing reagent.

48. The method of claim 47, wherein the amount of the compound of formula (I) ranges from about 2.0 to about 5.0 molar equivalents per molar equivalent of the chlorine-containing reagent.

49. The method of claim 48, wherein the amount of the compound of formula (I) ranges from about 2.0 to about 4.0 molar equivalents per molar equivalent of the chlorine-containing reagent.

50. The method of claim 38, wherein R_1 is $-CH_3$ and R_2 is $-(C_1-C_{20})$alkyl.

51. The method of claim 50, wherein R_1 is $-CH_3$ and R_2 is $-(C_{12})$alkyl.

52. The method of claim 38, wherein the amount of the compound of formula R_1SR_2 ranges from about 1.0 to about 9.0 molar equivalents per molar equivalent of the chlorine-containing reagent.

53. The method of claim 52, wherein the amount of the compound of formula R_1SR_2 ranges from about 2.0 to about 5.0 molar equivalents per molar equivalent of the chlorine-containing reagent.

54. The method of claim 53, wherein the amount of the compound of formula R_1SR_2 ranges from about 2.5 to about 3.5 molar equivalents per molar equivalent of the chlorine-containing reagent.

55. The method of claim 38, further comprising the use of a base.

56. The method of claim 55, wherein the base is an organic amine.

57. The method of claim 56, wherein the organic amine is triethylamine, diisopropylethylamine, pyridine, dimethylpyridine or dimethylaminopyridine.

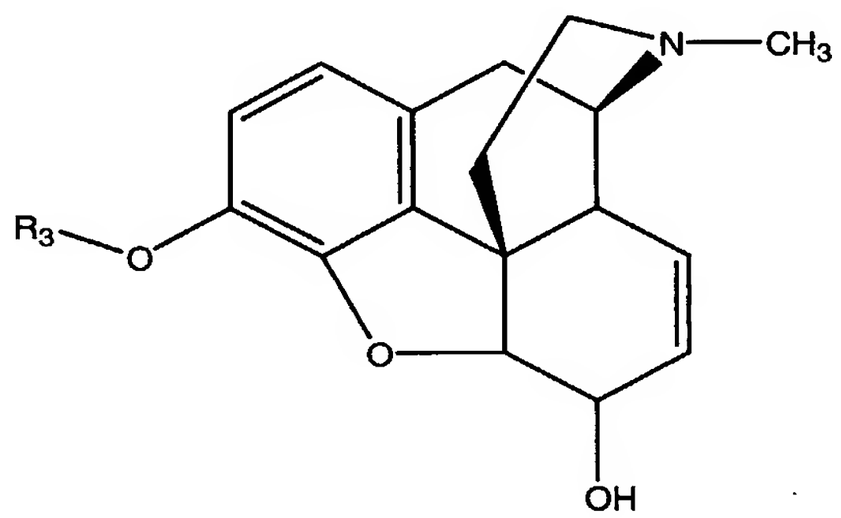
58. The method of claim 57, wherein the organic amine is triethylamine.

59. The method of claim 55, wherein the amount of base ranges from about 1.0 to about 15.0 molar equivalents per molar equivalent of the chlorine-containing reagent.

60. The method of claim 59, wherein the amount of base ranges from about 2.0 to about 10.0 molar equivalents per molar equivalent of the chlorine-containing reagent.

61. The method of claim 60, wherein the amount of base ranges from about 2.5 to about 7.0 molar equivalents per molar equivalent of the chlorine-containing reagent.

62. A composition comprising a compound of formula (I):



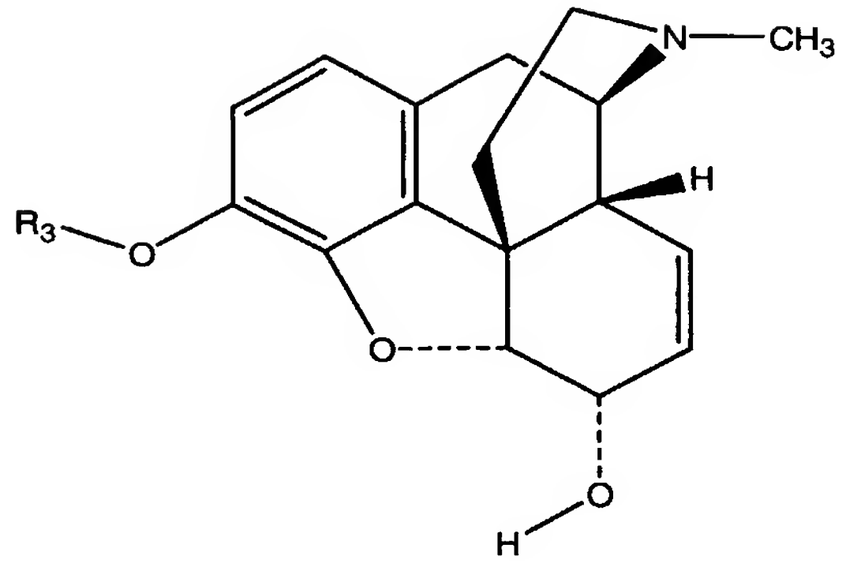
(I),

a compound of formula R_1SR_2 and a chlorine-containing compound; wherein

R_1 and R_2 are each independently -(C_1-C_{20})alkyl, -(C_3-C_8)cycloalkyl or -phenyl; and

R_3 is a protecting group.

63. The composition of claim 62, wherein the compound of formula (I) is a compound of formula (Ia).



(Ia).

64. The composition of claim 62, wherein the chlorine-containing reagent is trichloroisocyanuric acid, N-chlorosuccinimide, sodium dichloroisocyanurate, 1,3-dichloro-5,5-dimethylhydantoin, Cl_2, calcium hypochlorite, or any mixture thereof.

65. The composition of claim 64, wherein the chlorine-containing reagent is trichloroisocyanuric acid, N-chlorosuccinimide, Cl_2, or any mixture thereof.

66. The composition of claim 65, wherein the chlorine-containing reagent is trichloroisocyanuric acid.

67. The composition of claim 62, wherein R_3 is -$(C_1$-$C_{10})$alkyl, -benzyl, -C(O)$(C_1$-$C_{10})$alkyl, -C(O)O$(C_1$-$C_{10})$alkyl), -Si$((C_1$-$C_{10})$alkyl$)_3$, -Si(aryl)$((C_1$-$C_{10})$alkyl$)_2$, -Si(aryl$)_2((C_1$-$C_{10})$alkyl), -P(O)$((C_1$-$C_{10})$alkyl$)_2$, -P(S)$((C_1$-$C_{10})$alkyl$)_2$, or -S(O)OC_6H_4-*p*-CH_3.

68. The composition of claim 67, wherein R_3 is -Si$((C_1$-$C_{10})$alkyl$)_3$, -Si(aryl)$(C_1$-$C_{10})$alkyl$)_2$, or -Si(aryl$)_2(C_1$-$C_{10})$alkyl.

69. The composition of claim 68, wherein R_3 is -Si$((C_1$-$C_{10})$alkyl$)_3$.

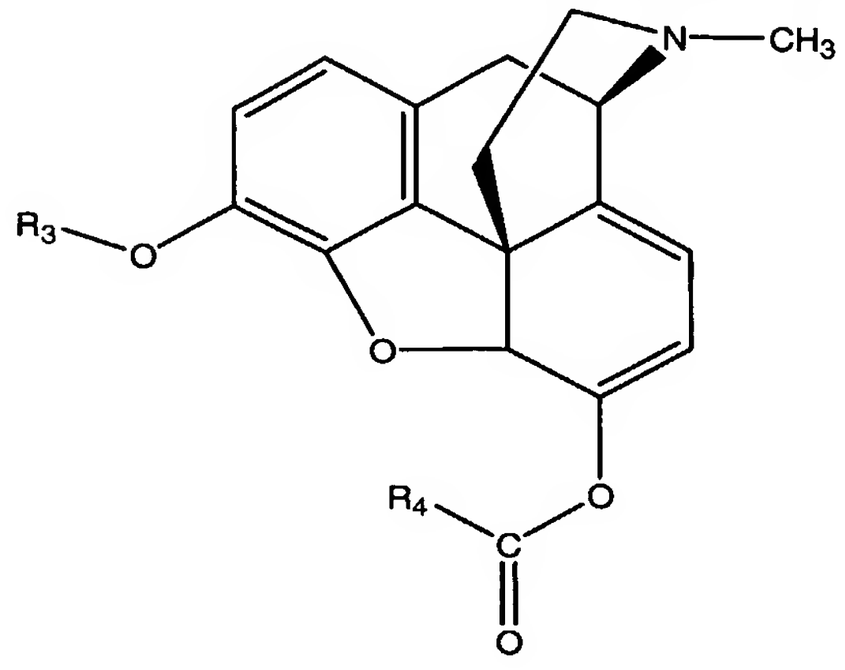
70. The composition of claim 69, wherein R_3 is -Si$(CH_3)_2(C(CH_3)_3)$.

71. The composition of claim 67, wherein R_3 is -CH_3.

72. The composition of claim 62 further comprising a base.

73. The composition of claim 62 further comprising an organic solvent.

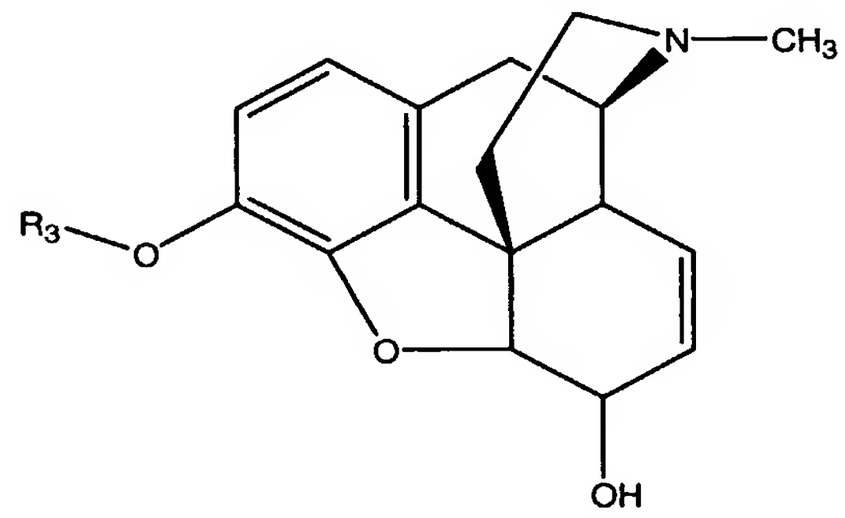
74. A method for making a compound of formula (III):



(III),

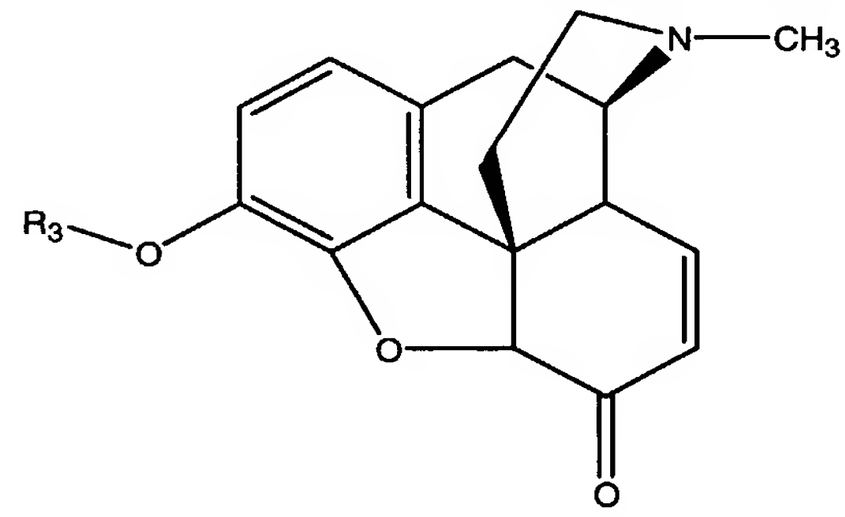
comprising:

(a) allowing a compound of formula (I):



(I)

to react in the presence of a compound of formula R_1SR_2 and a chlorine-containing reagent under conditions sufficient to make a compound of formula (II):



(II);

and

(b) allowing the compound of formula (II) to react with a first base and an acylating agent of formula $R_4C(O)OC(O)R_4$ or $R_4C(O)X$ under conditions sufficient to make the compound of formula (III), wherein:

R_1 and R_2 are each independently -(C_1-C_{20})alkyl, -(C_3-C_8)cycloalkyl or -phenyl;

R_3 is a protecting group;

R_4 is -(C_1-C_{10})alkyl; and

X is -Cl, -Br or -I.

75. The method of claim 74, wherein R_3 is -(C_1-C_{10})alkyl, -benzyl, -C(O)(C_1-C_{10})alkyl, -C(O)O(C_1-C_{10})alkyl), -Si((C_1-C_{10})alkyl)$_3$, -Si(aryl)((C_1-C_{10})alkyl)$_2$, -Si(aryl)$_2$((C_1-C_{10})alkyl), -P(O)((C_1-C_{10})alkyl)$_2$, -P(S)((C_1-C_{10})alkyl)$_2$, or -S(O)OC_6H_4-*p*-CH_3.

76. The method of claim 75, wherein R_3 is -Si((C_1-C_{10})alkyl)$_3$, -Si(aryl)(C_1-C_{10})alkyl)$_2$, or -Si(aryl)$_2$(C_1-C_{10})alkyl).

77. The method of claim 76, wherein R_3 is -Si((C_1-C_{10})alkyl)$_3$.

78. The method of claim 77, wherein R_3 is -Si(CH_3)$_2$(C(CH_3)$_3$).

79. The method of claim 75, wherein R_3 is -CH_3.

80. The method of claim 74, wherein the chlorine-containing reagent is trichloroisocyanuric acid, N-chlorosuccinimide, sodium dichloroisocyanurate, 1,3-dichloro-5,5-dimethylhydantoin, Cl_2, calcium hypochlorite, or any mixture thereof.

81. The method of claim 80, wherein the chlorine-containing reagent is trichloroisocyanuric acid.

82. The method of claim 81, wherein the amount of the compound of formula (I) ranges from about 1.0 to about 9.0 molar equivalents per molar equivalent of the chlorine-containing reagent.

83. The method of claim 82, wherein the amount of the compound of formula (I) ranges from about 2.0 to about 5.0 molar equivalents per molar equivalent of the chlorine-containing reagent.

84. The method of claim 83, wherein the amount of the compound of formula (I) ranges from about 2.0 to about 4.0 molar equivalents per molar equivalent of the chlorine-containing reagent.

85. The method of claim 74, wherein R_1 is $-CH_3$ and R_2 is $-(C_1-C_{20})$alkyl.

86. The method of claim 85, wherein R_1 is $-CH_3$ and R_2 is $-(C_{12})$alkyl.

87. The method of claim 74, wherein the amount of the compound of formula R_1SR_2 ranges from about 1.0 to about 9.0 molar equivalents per molar equivalent of the chlorine-containing reagent.

88. The method of claim 87, wherein the amount of the compound of formula R_1SR_2 ranges from about 2.0 to about 5.0 molar equivalents per molar equivalent of the chlorine-containing reagent.

89. The method of claim 88, wherein the amount of the compound of formula R_1SR_2 ranges from about 2.5 to about 3.5 molar equivalents per molar equivalent of the chlorine-containing reagent.

90. The method of claim 74, wherein step (a) further comprises the use of a second base.

91. The method of claim 90, wherein the second base is an organic amine.

92. The method of claim 91, wherein the organic amine is triethylamine, diisopropylethylamine, pyridine, dimethylpyridine or dimethylaminopyridine.

93. The method of claim 92, wherein the organic amine is triethylamine.

94. The method of claim 90, wherein the amount of second base ranges from about 1.0 to about 15.0 molar equivalents per molar equivalent of the chlorine-containing reagent.

95. The method of claim 94, wherein the amount of second base ranges from about 2.0 to about 10.0 molar equivalents per molar equivalent of the chlorine-containing reagent.

96. The method of claim 95, wherein the amount of second base ranges from about 2.5 to about 7.0 molar equivalents per molar equivalent of the chlorine-containing reagent.

97. The method of claim 74, wherein the first base is an organic amine.

98. The method of claim 97, wherein the organic amine is triethylamine, diisopropylethylamine, pyridine, dimethylpyridine or dimethylaminopyridine.

99. The method of claim 98, wherein the organic amine is triethylamine.

100. The method of claim 74, wherein the acylating agent is $R_4C(O)OC(O)R_4$.

101. The method of claim 100, wherein the acylating agent is $-CH_3C(O)OC(O)CH_3$.

102. The method of claim 74, wherein the acylating agent is $R_4C(O)X$.

103. The method of claim 102, wherein the acylating agent is $CH_3C(O)X$.

104. The method of claim 105, wherein the acylating agent is $CH_3C(O)Cl$.

105. The method of claim 74, wherein the amount of the first base ranges from about 1 to about 10 molar equivalents per molar equivalent of the acylating agent.

106. The method of claim 105, wherein the amount of the first base ranges from about 2 to about 7 molar equivalents per molar equivalent of the compound of the acylating agent.

107. The method of claim 106, wherein the amount of the first base ranges from about 3 to about 6 molar equivalents per molar equivalent of the compound of the acylating agent.

108. The method of claim 74, wherein the amount of the acylating agent ranges from about 1 to about 15 molar equivalent per molar equivalent of the compound of formula (II).

109. The method of claim 108, wherein the amount of the acylating agent ranges from about 1 to about 10 molar equivalent per molar equivalent of the compound of formula (II).

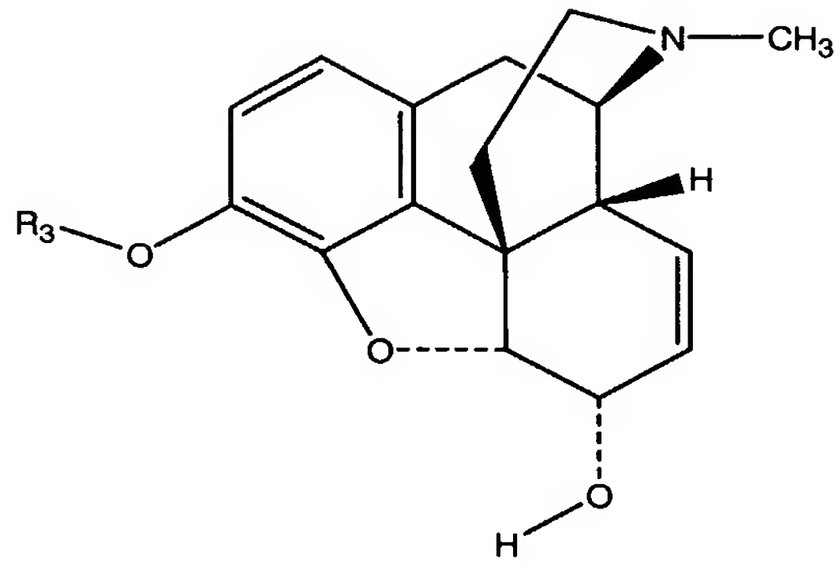
110. The method of claim 109, wherein the amount of the acylating agent ranges from about 2 to about 7 molar equivalent per molar equivalent of the compound of formula (II).

111. The method of claim 90, wherein the first base and the second base are the same.

112. The method of claim 74, wherein step (a) further comprises isolating the compound of formula (II) prior to carrying out step (b).

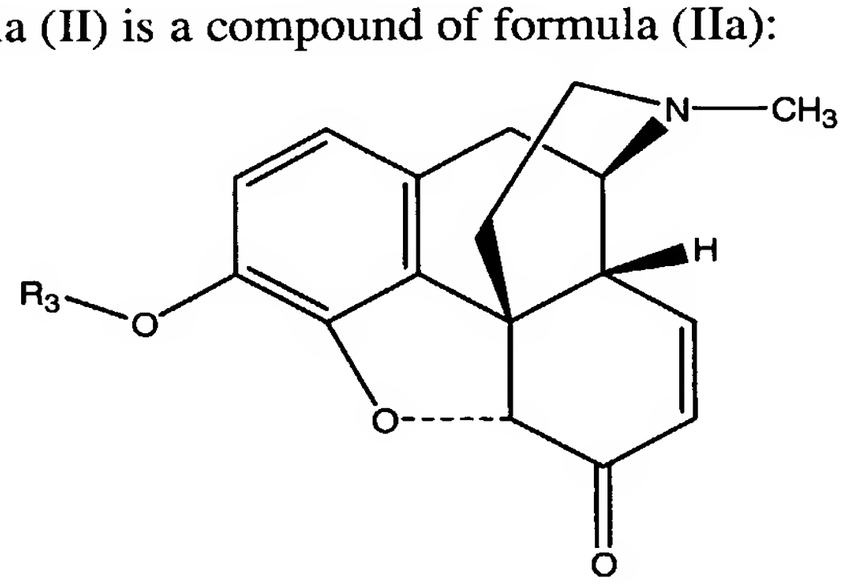
113. The method of claim 74, wherein step (b) is carried out without first isolating the compound of formula (II) prepared in step (a).

114. The method of claim 74, wherein the compound of formula (I) is a compound of formula (Ia):



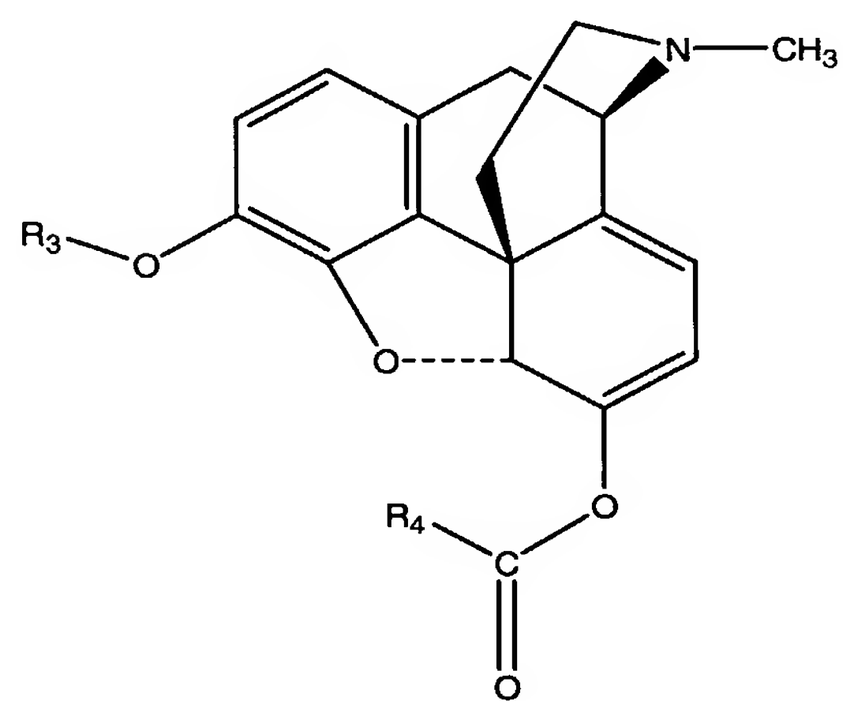
(Ia),

the compound of formula (II) is a compound of formula (IIa):



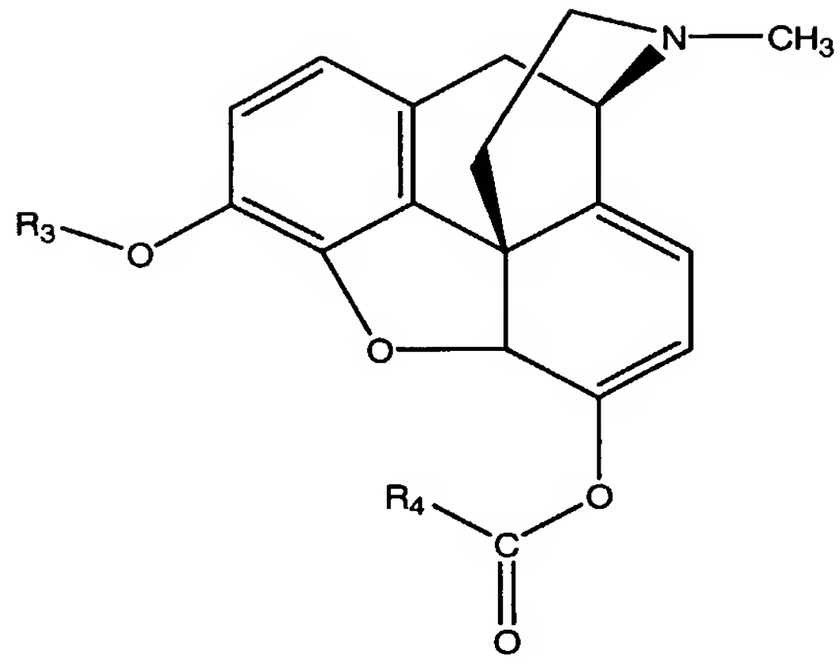
(IIa),

and the compound of formula (III) is a compound of formula (IIIa):



(IIIa).

115. A compound of formula (III):



(III),

wherein:

R_3 is $Si((C_1\text{-}C_{10})alkyl)_3$, $\text{-}Si(aryl)(C_1\text{-}C_{10})alkyl)_2$, or $\text{-}Si(aryl)_2(C_1\text{-}C_{10})alkyl)$; and

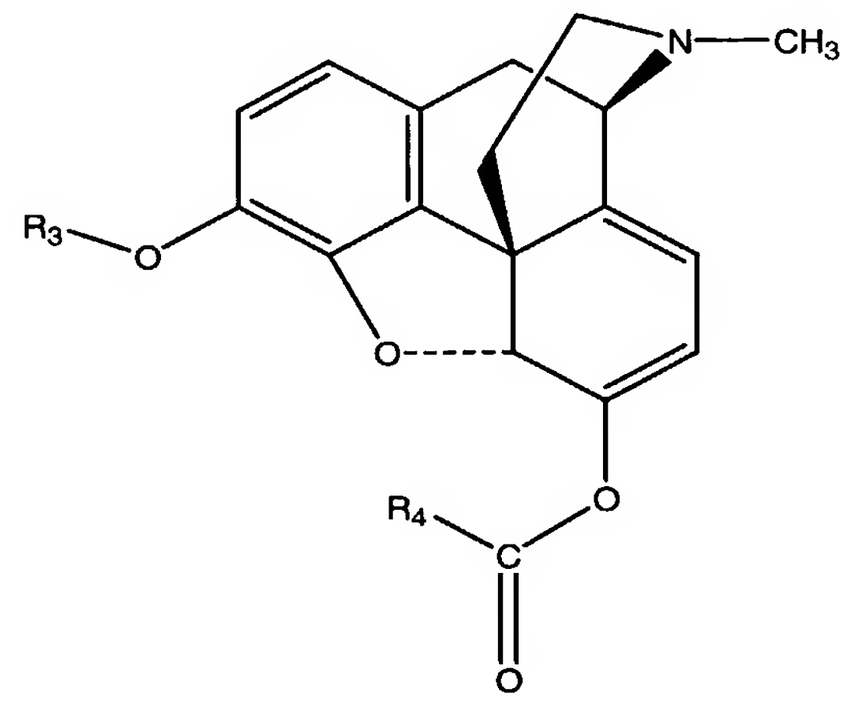
R_4 is $\text{-}(C_1\text{-}C_{10})alkyl$.

116. The compound of claim 115, wherein R_3 is $\text{-}Si((C_1\text{-}C_{10})alkyl)_3$.

117. The compound of claim 116, wherein R_3 is $\text{-}Si(CH_3)_2(C(CH_3)_3)$.

118. The compound of claim 117, wherein R_4 is $\text{-}CH_3$.

119. The compound of claim 115, wherein the compound of formula (III) is a compound of formula (IIIa):



(IIIa).